United States Department of Agriculture

Economic Research Service

Natural Resources and Environment Division

AREI UPDATES

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Irrigation Water Use, 1994

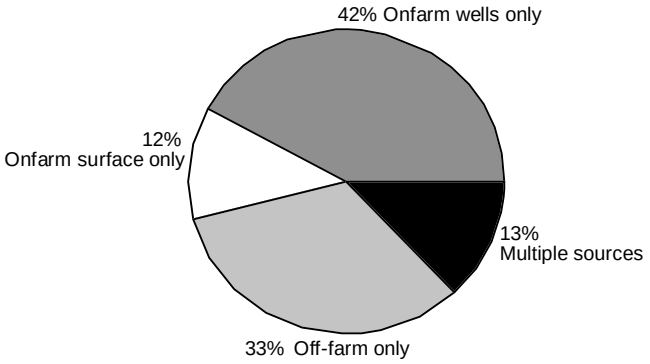
- **Onfarm wells provided roughly half of irrigation water applied nationally in 1994.**
- **Forty percent of irrigation water came from off-farm water sources concentrated in the Mountain and Pacific regions.**
- **Corn for grain accounted for the largest irrigated acreage, while alfalfa received the greatest volume of water.**

The 1994 Farm and Ranch Irrigation Survey represented 46 million irrigated acres (see box on page 4), 90 percent of U.S. irrigated acreage and 10 percent of total U.S. cropland (table 1). Irrigated crop production was concentrated in the 17 Western States, which accounted for nearly 70 percent of acres irrigated and 83 percent of total applied water. However, much of the recent growth in irrigated acreage has occurred in the more humid Eastern States.

An estimated 80 million acre-feet (maf) of water was applied on U.S. irrigated cropland in 1994 (1 acre-foot of water covers 1 acre of land to a depth of 1 foot, with 325,851 gallons). Onfarm wells were the largest source of irrigation water—supplying roughly half of total applied water—and the sole irrigation water source for 42 percent of farm operations (see chart). California used the largest quantity of groundwater, followed by Texas, Nebraska, and Kansas. In the eastern U.S., groundwater was the primary source of irrigation water—accounting for 75 percent of total applied water.

Off-farm supplied water totaled about 40 percent of applied water nationally. One-third of farm operators reported off-farm water supplies as the sole source of irrigation water. Off-farm supplies include purchased surface-water deliveries from districts receiving water from the U.S. Bureau of Reclamation, State water projects, private surface water developments, and, in a few cases, off-farm groundwater supplies. Off-farm water supplies were used primarily in the Mountain and Pacific regions of the western U.S., where river development for water storage has been most extensive. California was, by far, the largest user of off-farm supplied water for irrigation (11.4 maf), followed by Idaho (3.3 maf), Colorado, and Arizona. Off-farm supplies accounted for the largest share of water applied in Utah, Arizona, Wyoming, and Montana. Average application of off-farm supplied water (2.3 acre-feet per acre) was significantly higher than that applied from onfarm wells (1.4 acre-feet per acre) due primarily to lower costs, crops irrigated, and locational factors.

U. S. irrigated farm operations by source of irrigation water, 1994



Source: USDA, ERS, 1994 Farm and Ranch Irrigation Survey data.

Onfarm surface water accounts for a comparatively small share of total water applied—11 percent in 1994. Reliance on onfarm surface water was particularly significant in Louisiana, Montana, Wyoming, and Oregon, among States listed in table 1.

Corn for grain was the most extensively irrigated crop (9.3 million acres) in 1994, with roughly half of irrigated corn acreage in Nebraska alone (table 2). Other major irrigated crops--ranked by total acreage irrigated—were alfalfa hay, cotton, orchards, and pasture. Alfalfa hay received the largest quantity of applied water (11.8 maf), reflecting extensive irrigated acreage and high application rates (fig. 1). Other major irrigated crops—ranked by total water applied—were corn for grain, orchards, rice, and cotton. Of the ten largest water-using crops, rice had the highest average per-acre water application rate, followed by orchard crops, alfalfa hay, and vegetables.

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About AREI UPDATES

AREI UPDATES is a periodic series that supplements and updates information in **Agricultural Resources and Environmental Indicators (AREI)**, USDA, ERS, AH-705, Dec. 1994. **UPDATES** report recent data from surveys of farm operators and others knowledgeable about changing agricultural resource use and conditions, with only minimal interpretation or analysis. Please contact the individual listed at the end of the text for additional information about the data in this **UPDATE**. If you would like to be added to the mailing list or have other questions about **AREI UPDATES** or **AREI**, contact Richard Magleby, (202) 219-0436. [rmagleby@econ.ag.gov]

Table 1—Quantity of irrigation water applied by source, 1994

Geographic area	All sources			Onfarm wells			Onfarm surface			Off-farm suppliers		
	Acres irrigated	Water applied		Acres irrigated	Water applied		Acres irrigated	Water applied		Acres irrigated	Water applied	
	ta[1]	taf[1]	af/a[1]	ta	taf	af/a	ta	taf	af/a	ta	taf	af/a
United States[2]	46,418	79,627	1.7	28,816	39,429	1.4	5,927	8,579	1.4	13,919	31,619	2.3
17 Western States	32,053	66,119	2.1	16,732	28,640	1.7	4,657	7,511	1.6	12,726	29,969	2.4
States												
Arizona	752	3,310	4.4	340	1,146	3.4	26	100	3.9	492	2,064	4.2
Arkansas	2,854	3,196	1.1	2,582	2,837	1.11	272	346	1.3	13	13	1.0
California	7,245	22,474	3.1	3,877	9,821	2.5	629	1,259	2.0	3,911	11,394	2.9
Colorado	2,999	5,242	1.7	1,358	2,120	1.6	518	807	1.6	1,383	2,315	1.7
Florida	1,416	1,922	1.4	746	842	1.1	247	341	1.4	448	739	1.7
Georgia	620	325	0.5	450	256	0.6	169	68	0.4	1	0	0.3
Idaho	3,184	6,024	1.9	1,308	2,190	1.7	352	533	1.5	1,644	3,301	2.0
Illinois	272	169	0.6	252	158	0.6	18	7	0.4	2	3	1.7
Kansas	2,502	3,336	1.3	2,447	3,241	1.3	19	21	1.1	59	73	1.2
Louisiana	821	885	1.1	557	536	1.0	241	308	1.3	35	41	1.2
Michigan	305	166	0.5	185	83	0.5	116	48	0.4	8	35	4.4
Minnesota	327	185	0.6	293	151	0.5	25	20	0.8	10	15	1.5
Mississippi	647	685	1.1	624	638	1.0	25	46	1.8	0	0	0.9
Missouri	702	514	0.7	651	483	0.7	56	30	0.5	2	1	0.7
Montana	1,936	3,058	1.6	137	150	1.1	692	1,059	1.5	1,135	1,849	1.6
Nebraska	5,980	5,025	0.8	5,409	4,318	0.8	133	121	0.9	544	586	1.1
Nevada	520	1,138	2.2	203	515	2.5	185	304	1.6	156	319	2.1
New Mexico	686	1,630	2.4	381	878	2.3	57	90	1.6	275	663	2.4
North Dakota	157	139	0.9	94	73	0.8	27	19	0.7	37	47	1.2
Oklahoma	474	589	1.2	392	497	1.3	34	35	1.0	49	57	1.2
Oregon	1,587	2,947	1.9	501	665	1.3	565	877	1.6	683	1,405	2.1
South Dakota	304	303	1.0	179	109	0.6	54	53	1.0	73	141	1.9
Texas	5,101	7,606	1.5	4,319	5,746	1.3	204	384	1.9	607	1,476	2.4
Utah	1,085	2,412	2.2	196	499	2.5	163	249	1.5	742	1,664	2.2
Washington	1,435	3,126	2.2	502	923	1.8	164	344	2.1	828	1,859	2.2
Wisconsin	306	205	0.7	270	156	0.6	35	44	1.2	2	5	2.6
Wyoming	1,374	2,482	1.8	79	117	1.5	557	816	1.5	774	1,549	2.0

[1] *ta* = thousand acres; *taf* = thousand acre-feet; *af/a* = acre-feet per acre

[2] Conterminous United States excluding institutional, experimental, research, Indian reservation, and horticultural specialty farms.

Source: USDA, ERS, based on 1994 Farm and Ranch Irrigation Survey data.

Table 2—Irrigated acres by crop, 1994

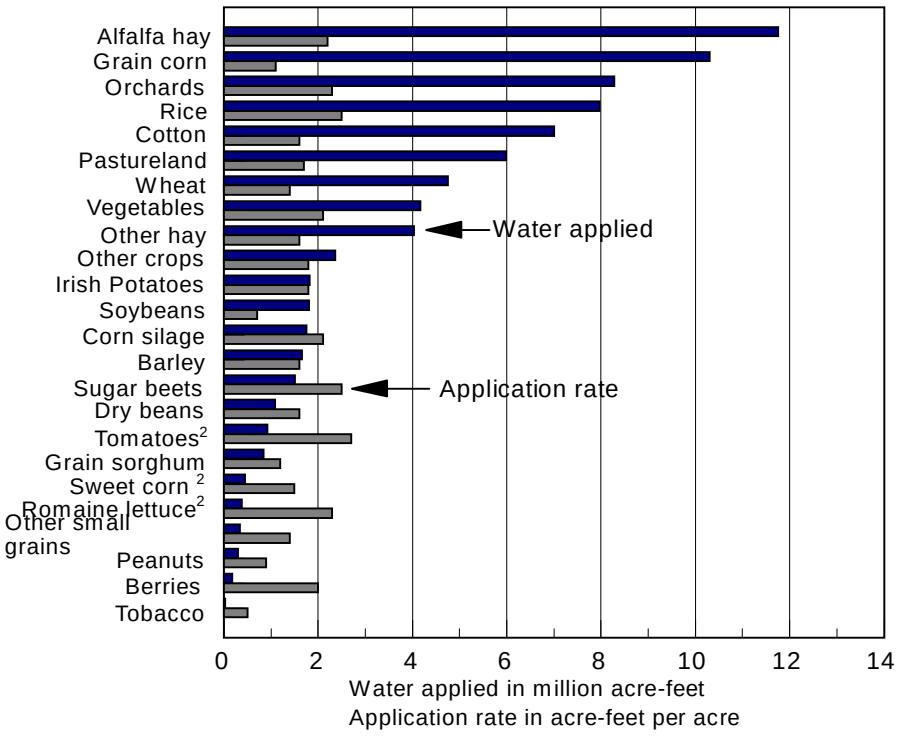
Geographic area	Corn grain	Alfalfa hay	Cotton	Orchards	Pasture-land	Wheat	Rice	Soybeans	Other hay	Vege-tables
					Thousand acres					
United States[1]	9,362	5,342	4,376	3,601	3,518	3,396	3,184	2,590	2,517	1,982
17 Western States	2,219	4,692	3,883	2,778	3,331	2,657	2,843	1,118	2,412	1,431
States:										
Arizona	14	103	277	61	33	88	0	0	27	100
Arkansas	30	0	430	10	4	13	1,275	1,052	5	5
California	154	731	1,005	2,203	495	323	620	0	177	833
Colorado	819	601	0	5	421	191	0	0	420	30
Florida	15	0	3	662	86	0	13	2	8	165
Georgia	117	1	135	126	14	15	0	27	13	29
Idaho	24	638	0	19	428	664	0	0	138	44
Illinois	160	0	0	0	0	1	0	56	nr	34
Kansas	1,238	187	0	0	17	596	0	177	13	0
Louisiana	26	0	218	0	7	0	507	43	3	7
Michigan	130	7	0	8	nr	7	0	32	2	55
Minnesota	133	17	0	0	1	2	0	49	2	12
Mississippi	15	0	223	2	nr	2	253	148	0	1
Missouri	256	6	97	1	nr	11	76	226	nr	5
Montana	7	623	0	2	460	156	0	0	305	1
Nebraska	4,552	310	0	0	52	68	0	539	41	2
Nevada	0	224	0	1	129	4	0	0	139	5
New Mexico	57	181	46	31	108	60	0	0	55	32
North Dakota	44	20	0	0	2	23	0	2	4	0
Oklahoma	71	31	79	0	28	130	0	7	20	4
Oregon	12	383	0	57	375	95	0	0	265	125
South Dakota	134	76	0	0	6	6	0	45	7	0
Texas	875	68	1,827	91	155	641	441	16	194	119
Utah	15	459	0	23	258	46	0	0	148	6
Washington	69	289	0	274	90	235	0	0	100	121
Wisconsin	63	13	0	2	0	0	0	18	2	98
Wyoming	45	361	0	0	338	11	0	0	416	1

nr = not reported

[1]Conterminous United States excluding institutional, experimental, research, Indian reservation, and horticultural specialty farms.

Source: USDA, ERS, based on 1994 Farm and Ranch Irrigation Survey.

Figure 1—Total water applied and average application rate, by crop, United States, 1994



[1]Conterminous United States excluding institutional, experimental, research, Indian reservation, and horticultural specialty farms.

[2]Also included in vegetables.

Source: USDA, ERS, based on 1994 Farm and Ranch Irrigation Survey data.

Farm and Ranch Irrigation Survey (FRIS)

The 1994 Farm and Ranch Irrigation Survey (FRIS)—conducted by the U.S. Department of Commerce, Bureau of the Census—provides detailed cross-sectional data on irrigated acreage, water use, water cost, and onfarm irrigation practices. Irrigation operations sampled for the 1994 FRIS were selected from irrigated farms and ranches identified in the 1992 Census of Agriculture. The FRIS sample included irrigated operations in the conterminous U.S. with agricultural production valued at $1,000 or more during the 1992 census year. Excluded were irrigators in Alaska and Hawaii, as well as institutional, experimental, research, Indian reservation, and horticultural specialty farms. The total FRIS sample of 19,988 irrigators operated 8.1 percent of irrigated farms and 33.1 percent of irrigated land. Survey samples were selected to provide information for 27 leading irrigation States, 7 Water Resource Areas, and the Nation.